WORK PACKAGE AGREEMENT

1. PROJECT/TASK/RTOP	2.DATE	3. VERSION	PAGE
Advanced Concepts and Technology Innovations	March 5, 1999	1	1 OF 2

4. WORK PACKAGE TITLE	5. ACCOUNT CODE
Advanced Cooperative Rovers Architecture	100101-0NM52

6. WORK PACKAGE LEADER	7. RESPONSIBLE SECTION MANAGER	8. PROJECT/TASK/RTOP MANAGER
H. Das	D. Eisenman	N. Marzwell
APPROVAL	APPROVAL	APPROVAL

9. WORK PACKAGE OBJECTIVES

ACR work for the next quarter consists of two subtasks listed below:

Task 1: Demonstrate an integrated multi-rover system exploring a simulated terrain and deploying to maximize the combined science return within limits of resources available.
Features to be added include a clean integration of the elements in the system and simplifying the initialization and execution of the demonstration.

10. DESCRIPTION OF WORK PACKAGE RESPONSIBILITIES AND APPROACH/ACTIVITIES

The objective of this task is to develop a powerful and general cooperative software architecture for mobile platforms and autonomous intelligent agents such as robotic manipulators, rovers, landers and aerobots. This layered architecture will provide natural functional decomposition for complex mobile platforms and other intelligent agents to perform tasks for future HEDS needs.

The architecture combines a distributed AI planner with a science layer to determine goals for the multiple mobile platform system to best utilize resource to maximize science return. The command sequences generated by the distributed planners are relayed to the respective platform control software which then drive simulated platforms through a simulated environment while feeding back realistic state and sensory information back to the control and planning software. This distributed software architecture adapts to a varying number of multiple agents and is robust to the loss of one or more members of the system.

The science layer in this architecture utilizes developments from the *Cooperating Rovers for Remote Field Geology Task.* The planning layer is based upon the Automatic Sequencing and Planning Environment (ASPEN) extended for multiple agents. A profile of resources monitored on the agents and made available to the planner increases the utilization of the mobile platform capabilities within their constraints. The platform control software used in this architecture is the actual software used to drive the Rocky 7 rover adapted for this simulation and the rovers and terrain simulator is the ROAMS environment based on the DARTS/Dshell software developed for spacecraft dynamics simulation. The integration of these advanced software components results in a unique simulation system capable of directing multiple agents to maximize their science return for the limited resources available.

The partnering plan, infusion plan and commercialization plan are not applicable to this task. Quarterly reports on progress made will be reported to the program manager.

11. Work Package Inputs/Outputs

Items	From/To	Date
Task 1	Section 345/Advanced Concepts and Technology Innovations	5/31/99

WORK PACKAGE AGREEMENT

WORK PACKAGE TITLE	DATE	PAGE
Advanced Cooperative Rovers Architecture	March 5, 1999	2 OF 2

12. WORK PACKAGE PERIOD OF PERFORMANCE

March 1,1999-May 31, 1999

13. COST/WORK FORCE

☐ ALLOCATION OR ☐ SUMMARY

☐ CURRENT FY OR ☐ TOTAL

COST: $30K

JPL WY: 1.0

CTR WY:

14. WORK PACKAGE ASSUMPTIONS / RESERVES / UNCERTAINTY ESTIMATES

The deliverables stated here are contingent upon the full funding as requested

15. SRM DETAILED BACKUP INFORMATION

The workforce is as follows:

• ROAMS development	Abhi Jain/Jeng Yen (345)	60%
• ORCAA integration	Richard Petras/Robert Steele (345)	10%
• Multi-rover ASPEN	Tara Estlin/Darren Mutz (365)	15%
• Resource profiling	Dennis Decoste(365)/Eddie Tunstel(345)	10%
• Task management	Hari Das (345)	5%

16. INDEX OF ATTACHMENTS

☐ **SCHEDULE**

☐ **WORK FORCE LOADING**

☒ **COST ESTIMATE/RACR: REVISION NO._____ DATED March 5, 1999**

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☐ **OTHER**

17. WORK PACKAGE DISTRIBUTION

Jan Smith Samad Hayati